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Harnessing the creativity of digital multimedia tools in distance learning

Judith P. Williams, Lecturer in Telematics

Soraya Kouadri Mostéfaoui, Lecturer in Web Technologies

The Open University, j.p.williams@open.ac.uk,

s.kouadri@open.ac.uk

ABSTRACT

Over the past few decades, advances in information and communication technologies, and particularly the digitisation of information, have brought about radical changes in the way media can be produced, distributed and shared. The exchange of information, once predominately the domain of the written word, now also embraces the digital technologies of audio and video. User-generated multimedia content proliferates, and the presence of audio and video adds dimensions that greatly increase the amount of information an audience can assimilate, adding a richness and depth to the messages we want to convey.

This paper presents and discusses a creative approach to the use of digital multimedia production tools incorporated in the Open University's 60 credit level 2 module, T215 Communication and Information Technologies. These tools are used in a way that:

- explores new ways to help people understand technical concepts;
- supports the development of students' technical skills;
- provides opportunities for students to be creative;
- provides an alternative to traditional text-based assessment.

We briefly explain the key decisions made by the module team during the design stages of the teaching materials and explain the common assessment framework used throughout the different blocks of the module. We then draw on the experience of two presentations of the module, each attracting around 500 students, to examine how students have engaged with the video creation activities and to identify issues that arise in supporting students for these tasks in a distance learning environment. Finally we discuss the success of the assessment task: a 30-second video designed to explain a technical concept related to one of the module topics.

KEYWORDS

Creative multimedia, assessment, creativity, distance learning,

INTRODUCTION

Video sharing over the Internet has recently gained unprecedented momentum. Several factors have contributed to this: the proliferation of mobile devices such as smartphones and tablet PCs, the popularity of social networking platforms such as Facebook, the incredible boom of video sharing websites such as YouTube and Dailymotion (Wesch, 2008), and the availability of cheap, easy to use video creation tools such as iMovie and Windows Movie Maker. The result has been radical changes in the way media can be produced, distributed and consumed. Indeed, until recently the production of audio-visual content was only the preserve of the professional media elite. However, with the current technology progress, multimedia production has been widely democratised and used in home and work-based contexts as well as in educational contexts (Ferreira et al, 2010; Kouadri Mostéfaoui et al, 2012).

The presence of audio and visual images adds dimensions that considerably increase the amount of information we are able to assimilate in a given period of time. This has greatly impacted the rapid adoption of Web 2.0 technologies in educational contexts (Conole & Alevizou, 2011; Lee, 2011). However, the deployment of multimedia as an assessment tools is only slowly taking place (e.g. Cox et al, 2009; Ferreira, 2010). This is mainly because multimedia creation is regarded as a highly creative task and is usually used in disciplines that are widely perceived as being 'creative'; rarely in technology-related topics.

This paper presents a case study of the creative deployment of digital multimedia in an educational context in order to enhance the students' learning experience. The context is the Open University's distance learning module T215 *Communication and Information Technologies*, which engages students in the production of a short video.

The paper starts by giving some general background information about the module and the activities within it that are the topic of this study. It then describes the common assessment framework used throughout the different blocks of the module and identifies some of the key decisions made by the module team during the design stages of the video creation materials. After that it explains the particular assessment task relating to the students' video creation work and describes the support offered to students. It then draws on the experience of two presentations of the module, each attracting around 500 students, to examine how students have engaged with the video creation activities and to identify issues that arise in supporting students for these tasks in a distance learning environment. Finally it considers the performance of students in the assessment task: a 30-second video designed to explain a technical concept related to one of the module topics.

BACKGROUND

T215 *Communication and information technologies* is a 60 credit Level 2 module covering various topics in information and communication technologies such as computer networks, mobile telephony, social networking, biometrics and digital multimedia. It is a compulsory component in the UK Open University's BSc degree in Computing and IT and is designed to build students' knowledge of the basic principles of information and communication technologies (ICTs) and the issues relating to their use, to develop students' ability to apply their understanding in practical ways and to equip them with the skills to keep abreast of future technological developments. Another important strand of the module is the development of students' skills in communicating their knowledge of ICTs to others – and this explains the unusual ordering of the terms 'communication' and 'information' in the module's title.

The module culminates in a short project, of around 80 hours work, in which students investigate two specified ICT topics (not previously covered in the module) and convey their resulting knowledge to others through a report and content for a set of web pages. The understanding and skills students will need to tackle this project are built throughout the rest of the module during their study of five themed blocks, each of an approximately equal workload of 80 hours spread over five or six weeks, and each assessed by a tutor marked assignment (TMA). The module is delivered through a mix of printed materials, on-line materials and technology tools used in a way that enhances the students' experience by providing opportunities for practical experimentation to reinforce their learning.

This paper focuses on the way technology is used in Block 5 of the module. The topic of this block is the digitisation of information and how developments in the production and distribution of media – particularly audio and video - have led to new and powerful ways of conveying ideas and information which challenge the previous dominance of the written word. When designing this module, the module team had several key aspirations:

- to provide students with the knowledge and skills to enable them to contribute creatively to the pool of user-generated multimedia content;
- to help students to explore new ways to explain technical concepts;
- to provide opportunities for students to be creative;
- to provide an alternative to traditional text-based assessment;
- to teach some fundamental principles about the digitisation of analogue data.

The technology used in this block is the main vehicle through which these aspirations are realised.

Using carefully selected software, Block 5 guides students through the production of a short video that explains a technical concept in a richer and more powerful way through the use of images, sound effects and editing effects. The topic of this video is aliasing - a phenomenon that occurs when reconstruction of digitally sampled analogue data results in distortion. The video (which can be viewed by following [this link](#)) is only 30

seconds long, yet successfully explains and illustrates how aliasing can arise during image processing and how it can be prevented.

During their work, students are helped to develop an understanding of audio and picture encoding and editing, so the block combines principles of ICTs with practical skills of using ICTs to communicate information. The block's software provides students with frequent opportunities to explore, test and experiment with many of the concepts taught. For the block's assessment task, students must use the software and methods introduced in the block to produce a short video of their own that explains a particular technical concept chosen from a range of options.

THE COMMON ASSESSMENT FRAMEWORK

All five of T215's blocks assess students' performance in communicating information about information technology to a specified audience. For the first four blocks, this relates to written communication, either in the form of an informative document, report or web page. The introduction of video production as an assessment task in the fifth block suggests that new ways of evaluating students' performance would be required. However, because of the module's strong focus on the development of skills in communicating about technology, the module team felt it was important to maintain a consistent approach to grading and feedback, and this resulted in the development of a common assessment framework that could be used throughout, not only for grading and providing feedback on students' work but also as a tool students are encouraged to use themselves for self-evaluation and review.

The framework, which is introduced in the module's first block, consists of six criteria, presented in the form of questions. Two of these relate to content and carry the majority of the marks (ranging from two-thirds to three quarters of the total available); the remainder relate to presentation. As Table 1 will show, only a little modification of the questions was needed to adapt the framework to change from text-based to video-based communication.

Table 1 The T215 assessment/evaluation framework

	Assessment/evaluation of written documents	Assessment/evaluation of video
1	Does the document meet the brief?	Does the video meet the brief?
2	Is the content factually accurate?	Is the content factually accurate?
3	Is the structure appropriate for the audience, purpose and medium?	To what extent are the following appropriate, and do they support each other in achieving the purpose for the intended audience: the chosen image(s), the video editing, the narrative, any texts, any audio effects?

4	Is the style appropriate for the audience, purpose and medium?	Are the ideas presented in an order that is appropriate for the intended audience, purpose and medium?
5	Is the technical level appropriate for the audience, purpose and medium?	Is the technical level appropriate for the intended audience, purpose and medium?
6	Is the English correct?	Is the narrative clear, understandable by the intended audience and appropriately paced?

SELECTION OF SOFTWARE TOOLS FOR BLOCK 5

Creation of the video in Block 5 involves several main tasks: the manipulation of still images to give the illusion of movement, the creation of a commentary with sound track and the combination and synchronisation of the video and audio elements with final rendering of the result to a standard video format suitable for popular media players. The selected software must support all of these activities and in addition the module team specified that the tools should:

- provide the functionality for students to explore the technical concepts introduced by the block
- be easy to learn and use
- be low cost or free

For the audio production, the free, open source software Audacity was selected. It met the module team's specifications and had been used successfully on a number of other modules. Selection of the video production software proved to be more problematic. Software that adequately provides the functionality to explore the technical concepts tends to be aimed at a professional user, to require a significant time commitment for learning its use and to be relatively expensive. Eventually the module team selected the free, open source software AviSynth.

AviSynth has no graphical user interface: software instructions are given through a scripting language as text commands using a specified syntax. Use of the AviSynth scripting language resulted in two significant benefits in this context. First, it enabled the module team to support students in acquiring some familiarity with a scripting language and thus prepare them for the possibility of further related study at a later stage. Second, it enabled the module team to simplify the students' task by providing them with a set of AviSynth scripts as a starting point. Students then modify the scripts for their own experimentation and, later, their video production. AviSynth scripts can be produced using a standard text editor though a dedicated text editor, AvsP, is available which helps to simplify the task by providing prompts for the script syntax and a video previewer to assist in script testing.

The full software package finally selected was:

- Audacity for the audio creation and manipulation
- AviSynth for the video creation and manipulation
- AvsP for the script editor
- VirtualDub for the audio encoder
- Xvid for video compression and output to standard media player file format.

These tools are provided for students on a DVD with an installer program and are supported with a written software guide.

THE ASSESSMENT TASK FOR BLOCK 5

Block 5's assessment is structured around three main tasks the students must accomplish - namely, planning a video, creating the video using AviSynth and finally evaluating the video.

Students are advised that their videos should explain one of the technology-related concepts presented in earlier blocks of the module. As an example, for the first presentation of the module, they were asked to choose a concept related to one of the following topics: sharing data, digital identity, social networking and mobile communication. For the second presentation, the module team proposed another set of topics which included digital data storage, computer security, GPS and digitising sound. (New topics are proposed for each presentation.) Because of the time and effort required to produce such videos, to avoid large file sizes and in order to maintain a balance with other blocks' assessments, the length of the video is restricted to 30 seconds but a number of minimum requirements are stipulated. These include the use of at least one still image, a sound track with a voice commentary, at least two sound effects and/or background music and at least three different editing techniques achieved using AviSynth functions. The stipulated audience for the students' videos is a group of students who have not previously studied T215.

For the planning task students are provided with a video plan template in which they are asked to identify the required image(s), sound(s), duration(s), transition(s) and any effect(s) as well as the voice commentary for each of the video scenes. Additionally, they are asked to provide a brief description of how the video will explain the chosen concept. For the video creation task, students are asked to produce a set of AviSynth scripts according to their video plans and to use the provided tools to render the created scripts into a format compatible with popular media players. Finally, in order to assess how well the created video met the objectives stated in the video brief, students are asked to use the assessment framework described in the Common Assessment Framework section of this paper in order to evaluate the quality of their own videos.

Although encouraged to seek out or create their own images and sounds, students have been provided with a set of resources which include a bank of copyright free images and sounds to use in the production of their videos. Clear guidelines on how to acknowledge copyrighted material are given.

STUDENT SUPPORT

T215 follows the Open University's standard model of student support which is the allocation of a personal tutor who will typically support a group of around 20 students studying the same module. The tutor offers five or six optional tutorials throughout the T215 presentation (one of which falls during the Block 5 study period), either face-to-face at a local study centre or online using Elluminate. General communication with the group is carried out in an online group forum, and individual interaction between tutor and student typically takes place by email or telephone conversations. A major portion of the tutor's teaching occurs through detailed written feedback on students' TMAs, which the tutor also marks.

In addition, T215 hosts moderated cohort-wide online student forums for each block. These forums provide a space where students can discuss with each other the contents of blocks, ask questions about particular parts that are troubling them, share ideas about how they might approach the assignments and generally offer support to each other as they work through the material. The forums are intended to promote peer learning and so the forum moderators tend to step in only to correct misconceptions, to answer questions about administrative processes and interpretation, or to provide replies to academic queries that have not been adequately picked up by other students.

For Block 5, two moderated cohort-wide online forums are provided, one for general discussion of the block topics and the other for technical problems relating to the specialist software. In the first year of presentation these forums were moderated by members of the module team and in the second year by one of the Block 5 tutors who had built up considerable expertise in use of the software. During the first year, a bank of frequently asked questions and their answers was built up and made available in the online forum, and this was rolled over and supplemented in the second year.

EXPERIENCE ON THE MODULE'S FIRST TWO PRESENTATIONS

Before the first presentation, the software and activities were all tested by members of the module team, by critical readers and by technical staff within the University. Not surprisingly, though, when software is used by around 500 students running computers with different operating systems, different configurations, different versions of system tools and other software installations that interfere with one another, unexpected effects are likely to emerge. Thus it was during the first year of T215's Block 5 presentation, causing problems for some students trying to use the tools and for staff trying to support them. These problems were addressed before the second presentation.

In general though, the use of several unfamiliar software tools, the unaccustomed demands of the video creation task and the introduction of scripting inevitably introduced several new challenges and unfamiliar experiences for both students and staff. Both these groups are considered separately in the subsections that follow. The points identified here have been drawn from comments or discussion in the module-wide online Block 5 student forums and tutor forum (not open to students), comments in tutor

surveys and discussions in a live tutor debriefing session at the end of the first module presentation.

Experiences from the student perspective

This block was welcomed by many students, as evidenced by comments made in the Block 5 student forum, such as: "I enjoyed Block 5 above any other"; "I really enjoyed the change from reports - a different sort of challenge and a welcome break"; "This block was interesting, I have learned something new"; "The insight gained into how to manipulate images and sounds to produce a basic video has been good fun, interesting and a challenge. It's inspired me to pursue this some more in my personal time." Several tutors commented on their students' enjoyment of the block and sense of achievement, though there was also an acknowledgement that some students struggled due to poor IT skills, software 'teething' problems or unfamiliarity with programming.

Where students experienced difficulties with the software, many of these were due to either non-standard computer configuration or from the software installation – either failure to install correctly or to install completely, usually resulting from ignoring or misinterpreting instructions given in the DVD software guide.

Another common source of difficulty was in the script execution. Some students failed to appreciate the need to work systematically through the block teaching materials, instead attempting to take short-cuts which led to them omitting to study key sections. Other script problems arose from syntax errors and unfamiliarity with AvsP's error messages.

All T215 TMAs are submitted electronically, and the file size limit imposed by the University presented problems for some students, either because they had used too many images, used images that had large file sizes or not carried out digital compression on their sound track. Some students also found it difficult to comply with the assignment's prescribed file structure.

The student online forum for Block 5 was busy throughout the Block 5 study periods during both presentations under discussion and it was interesting to note in both years that several student 'experts' emerged who were active in helping other students in trouble-shooting specific problems. It was clear from some of the messages posted that some students were going somewhat beyond the requirements of the module and were extending their use of AviSynth to produce additional enhancements and special effects for their videos.

Experiences from the staff perspective

The overhead of having to learn new software was a common hurdle that tutors identified at the end of the first presentation, though none reported having found the task challenging, only time consuming, and in subsequent years this ceases to be an issue for continuing tutors.

None of the tutors reported finding it difficult to make grading judgments on the assignment; some said they found it "very straight forward to mark" or "relatively quicker

to mark [than other assignments]”. One tutor reported it being time consuming “to work out where the scripting had gone wrong” (though tutors had not actually been asked to do this).

When tutors were asked how easy they found it to adjust their use of the assessment/evaluation criteria from grading and commenting on written content to grading and commenting on video content, 84% of the respondents said ‘very easy’ or ‘quite easy’.

Experiences gained in the first year of presentation enabled the module team to make certain modifications to address particular issues for the second year cohort. For example, the software installation instructions were improved and students were supplied with a document that collected together all the AviSynth commands introduced in the block to form a compact reference source for them. The second year student cohort also had the benefit of access at the start of the block to the full set of frequently asked questions and answers that had been built up over the previous year’s presentation.

DISCUSSION

At this point, it should be noted that strong statistical data of the students’ performance and experiences during Block 5 is not available. The following discussion is based on our understanding and perception as module team members having continuous contact with tutors and students through forums.

A few weeks after the end of Block 5 in both presentations under consideration, students were invited to share their videos with the rest of the module cohort by posting them into the online student forum. For the first presentation, this was taken up by 9.2% of students who submitted the Block 5 TMA, and for the second presentation by 7.1%. Taking account of the fact that this was entirely voluntary and that students were working towards the EMA at the time, these figures indicate that many students had a feeling of pride in the videos they had produced and an enthusiasm for show-casing their work among their peers. The quality of the videos was generally very good, with some being excellent. Links to three examples are given below.

[Example 1: Digital identity](#)

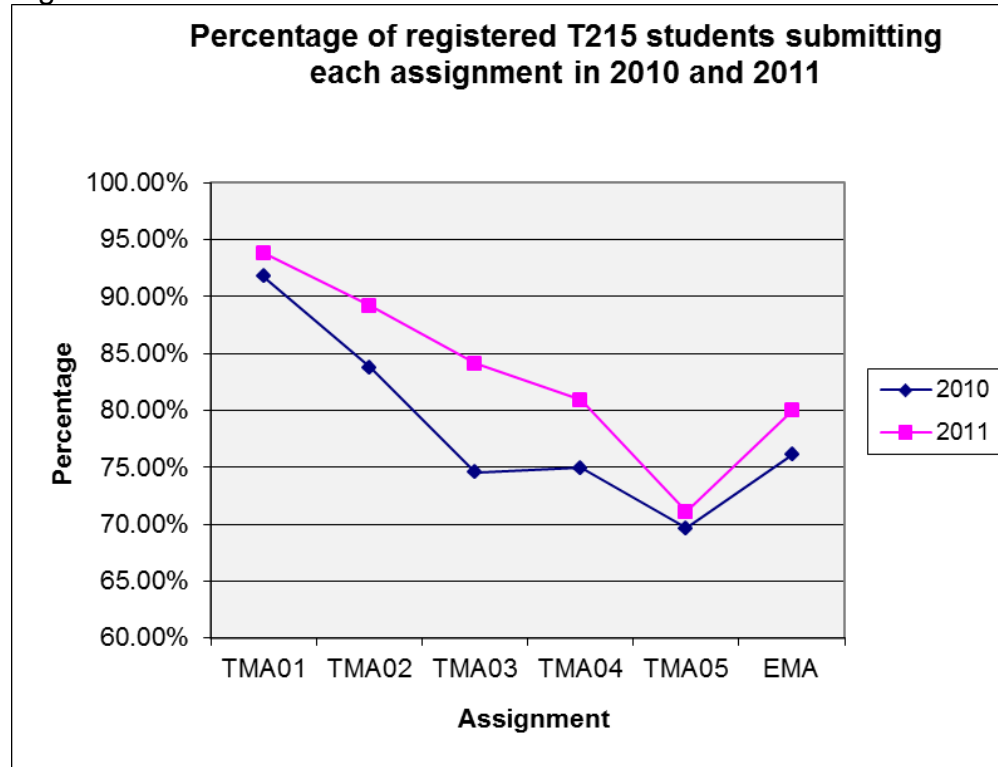
[Example 2: Text messaging](#)

[Example 3: Social networking](#)

Tutors reported more of a mixed video quality in those submitted to them for marking and suggested that there was a higher proportion of non-submissions than other blocks’ assignments. Analysis of the TMA submission data revealed that the percentage of students submitting the Block 5 assessment was noticeably lower than the percentage submitting the final end of module assessment (EMA) for both of the presentations (Figure 1). This is not uncommon for the last TMA in Open University modules because some students who have already achieved the minimum overall continuous assessment score may decide to focus their energies on the final examination or EMA. However, the

data suggests there may be other factors in play here because the Block 5 TMA submission rates are similar for both presentations even though the overall submission rates for the other TMAs are higher for the second presentation.

Figure 1



From the evidence in the Block 5 forums alone, it would be easy to form the opinion that the majority of students experienced problems with the Block 5 software and TMA task but this would be erroneous. The number of students posting messages to the Block 5 forums is much lower than the overall cohort, indicating that many students did not experience the sort of problems that would prompt them to ask for help. The evidence coming from tutors also supports this view; when asked in a survey to indicate what problems arose from their students' use of Audacity and AviSynth, the majority of tutors reported no problems with Audacity and generally that only a few of their students experienced problems with AviSynth. One tutor said "Students with poor IT skills struggled to get to grips with this. [...] The technically competent ones breezed through."

There is no doubt that a small number of students do experience problems with the practical demands of Block 5 and this could be a key factor in the decision of whether or not to attempt this final TMA of the module. However, in both presentations under discussion, the average TMA mark for Block 5 shows that students perform as well or better than in other TMAs of the module. There is also considerable evidence that students enjoy the module and the opportunity to produce creative pieces of work, that they appreciate the change to a non text-based assignment and value the skills the module enables them to build. This is demonstrated by the following two student

comments: “Despite my previous protestations .. this block was interesting, I have learned something new.”; “A great block. The study materials combined with the software worked together very well. The insight gained into how to manipulate images and sounds to produce a basic video has been good fun, interesting and a challenge. It's inspired me to pursue this some more in my personal time”.

Overall, the module team's perception is that, although students may find the video production activity challenging, their learning experience is enhanced by the block's use of the software and the affordances it offers for expressing their own creativity.

CONCLUSION

We conclude with a quotation from Cornally (2011) which has relevance to the teaching and assessment approaches described in this paper:

“Our modern information age needs curious, humble minds—people willing to absorb new knowledge, think critically and put information into context. Abandoning a narrow, one-size-fits-all approach to curriculum standards would help students develop the curiosity they need to become the innovators of the future. That matters more than the ability to recall an answer on the test.”

The teaching material in Block 5 of T215 was constructed around a set of practical activities aiming at progressively supporting the development of students' technical knowledge and skills. The assessment task – the production of a 30-second video related to a technology concept – meant that students also had to think critically about the topic they chose to explain and to find a suitable context in which to present it. Critical thinking also formed part of the self-evaluation activity.

Finally, and as a reminder, we repeat the module team's design aspirations for Block 5 of T215, all of which were fulfilled by the creative deployment of technologies.

- to provide students with the knowledge and skills to enable them to contribute creatively to the pool of user-generated multimedia content;
- to help students to explore new ways to explain technical concepts;
- to provide opportunities for students to be creative;
- to provide an alternative to traditional text-based assessment;
- to teach some fundamental principles about the digitisation of analogue data.

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